

US EPA ARCHIVE DOCUMENT

## STATEMENT OF BASIS / REQUEST FOR PUBLIC COMMENTS

*General Electric Consumer and Industrial*

*Patillas, Puerto Rico*

Facility/Unit type:	General Electric Puerto Rico Investments
Constituents:	1,2-dichloroethane (1,2-DCA), 1,1-dichloroethylene (1,1-DCE), tetrachloroethylene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), trichloroethylene (TCE), and vinyl chloride (VC)
Media:	Groundwater – All constituents
Remedies:	Monitored Natural Attenuation and Institutional Controls

### FACILITY DESCRIPTION

The Site is located along the southeastern coast of Puerto Rico at Road #3, Km. 122.9, Patillas, Puerto Rico. The Site is currently leased by GE Energy from the Puerto Rico Industrial Development Company (PRIDCO), and has historically been used for warehousing and manufacturing of electro-mechanical products. These operations were discontinued in June 2010.

The Site is bordered on the west by an unnamed road, to the north by residential and undeveloped properties, to the east by an undeveloped property, and to the south by Road #3. South of Road #3 is a wastewater treatment plant (owned by the Puerto Rico Aqueduct and Sewer Authority (PRASA), a pharmacy, bank, and gas station. The general topography in the area slopes from the northwest towards the southeast. Current land use in the area is a mixture of residential and commercial property. Groundwater in the area is not used for drinking water.

### SITE GEOLOGY AND HYDROGEOLOGY

The Site is located on the edge of a coastal plain approximately one-half mile northeast of the Rio Grande de Patillas. The area is underlain by interbedded sedimentary deposits of alluvium/colluvium to a depth of approximately 25 to 40 feet. Underlying the sedimentary deposits is weathered bedrock material (saprolite). The

saprolite consists primarily of silty fine-grained sand and clayey silt and generally continues to depths of approximately 90 to 100 feet. The saprolite appears to have retained the relict rock structure of the underlying crystalline bedrock.

In general, the alluvial deposits consist of interbedded well-graded and poorly-graded sands. Some strata contain higher amounts of silt and clay. The sandy deposits range in thickness from as little as 6 feet at the northern site boundary to as great as 26 feet west of the Site. In some areas the colluvial deposits contain gravel, cobbles, and large boulders. Three discontinuous lenses have been identified beneath the Site that consist primarily of low lasticity silts.

Two hydrogeologic units are present beneath the Site. In the onsite area, the alluvium/colluvium and saprolite underlying the Site create an aquifer approximately 90 feet thick. Although, the alluvium/colluvium and saprolite units are hydraulically connected to create one aquifer, they differ in geologic and hydrologic properties.

Wells onsite and offsite have previously been installed in shallow and deep zones of the alluvium/colluvium aquifer. The shallow zone wells are screened across the water table and range in depth from 13 to 26 feet below ground surface (bgs), and the deep zone wells range in depth from 35 to 73 feet bgs.

Local groundwater flow is to the south-southwest toward the Rio Grande de Patillas, the discharge area for the local groundwater. The Rio Grande de Patillas is considered a hydraulic barrier for groundwater flowing from the Site towards the south-southwest. The Quebrada Mamey is located approximately 400 feet southwest of the Site. Depending on flow and the amount of precipitation, this surface water feature acts as either a discharge point or recharge source for shallow groundwater.

### PREVIOUS INVESTIGATIONS

The Area of Concern is a French Sump that was constructed at the facility in 1977 and was operated for waste disposal until 1980. The sump consisted of a rubble-filled hole 12 feet deep and 10 feet in diameter, covered by a concrete cap and manhole. Wastes reportedly discharged into the sump included plating tank wastewater sludge's, waste (spent) oils, and spent solvents. The use of the French Sump was discontinued in early 1980. In 1985, Volatile Organic Compounds (VOCs) were detected in a PRASA drinking water supply well, which was subsequently shut down. EPA issued a 3008(h) order in 1988 to GE conduct a site investigation and

perform an interim source removal. On July 1990 stabilization activities (excavation, stabilization and removal of contaminated soil) were conducted in accordance with the Interim Remedial Measures Work Plan. On October 1990, USEPA granted closure approval of the sump. A year later, a RCRA Facility Investigation (RFI) revealed that the French Sump was the principal source of VOCs to the local groundwater.

The RFI (October 1991) was conducted to determine the nature and extent of any historical releases of hazardous constituents from the identified potential source. The efforts were directed at assessing the nature and extent of on-Site contamination and potential relationship to the off-Site groundwater supply, including the Puerto Rico Aqueduct and Sewer Authority (PRASA) water supply wells.

In summary, the RFI found the following:

- The only source of VOCs to the local groundwater (the French Sump) was eliminated with the removal of the sump in 1990.
- Two contaminant plumes were identified: 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichloroethene (1,1-DCE).
- No potential receptors (human or ecological) were identified between the Site and the Rio Grande de Patillas.

A Draft Corrective Measures Study (CMS) Report for the Site was submitted to USEPA in 1993, and since then GE began quarterly groundwater monitoring as a self-implementation of the CMS published preferred corrective measure: Monitoring Natural Attenuation (MNA).

USEPA expressed concerns at consecutive meetings held with GE whether the extent of downgradient contamination had not been adequately characterized and the presence of recoverable dense non-aqueous phase liquid (DNAPL) had not been discontinued. This information was insufficient to implement a natural attenuation corrective measure.

In response to these concerns, GE submitted a focused Supplemental RFI (SRFI) documenting the downgradient extent of the VOC's in the aquifer beneath the agricultural fields to the south and west of the Site and the feasibility of a MNA remedy at the Site

Groundwater monitoring conducted during the SRFI (2005) and as of to date has demonstrated that Contaminants of Concern (COCs) in groundwater are naturally attenuating. The extent of the VOCs in the groundwater has been fully delineated in all aquifer units and the size of the plume in the water table and deep aquifer zones is shrinking. Concentrations of COCs have decreased two orders of magnitude in the time period from 1989 to 2015.

## EXPOSURE PATHWAYS

Currently, based on the information presented, there are no identified exposure pathways or receptors relative to the groundwater. No wells for drinking water, water supply, or irrigation have been identified down-gradient of the Site in the area of groundwater impact. Groundwater ingestion, direct contact, and other exposure pathways do not exist. Vapor intrusion to buildings is not of concern because no buildings exist in the area of groundwater impact; there are only limited structures associated with the closed PRASA facility.

With respect to potential future exposure pathways and receptors, the most conservative potential future land use scenario (residential) was considered in the development of the CMS. By selecting the conservative residential scenario, other less conservative property uses would be automatically addressed (e.g., commercial, industrial, agricultural, construction worker). Although the installation of drinking water wells down-gradient of the Site is highly unlikely and PRASA-supplied water is available, the CMS considers the potential for installation of a downgradient drinking water well. Exposure to groundwater could occur via ingestion and/or direct contact.

## Soil

The method by which wastes were disposed of at the Site (into the French Sump) did not result in an impact to surface soils. Subsurface soils that were impacted were removed along with the French Sump in 1990, and COCs concentrations in groundwater at monitoring well P-11 have been non-detect or trace since 1999, indicating minimal residual soil contamination remains in the former source area. Based on the fact that initial impacts were to subsurface soils that have since been removed, an exposure pathway for soil direct contact does not exist.

## Groundwater

Drinking water is obtained locally from PRASA wells which provide water for the town of Patillas, including industrial uses. The PRASA wells in the vicinity of the Site are located

up-gradient and therefore are not impacted by former activities at the Site.

Sampling of PRASA wells was conducted in 1989 and confirmed that no VOCs were present. No wells are known to exist in the footprint of the VOC plume, and no groundwater wells or new buildings have been observed on the adjacent property since the SRFI was completed in 2005. The surrounding area has been visited and inspected at least once per year from 2005 through 2012 during groundwater monitoring and site investigation activities. However, since this area is not owned by GE and groundwater use restrictions are not known to be in place, the use of groundwater within this area is possible. An exposure pathway for groundwater direct contact or ingestion could potentially exist in the area downgradient of the Site.

The Site is situated within an area that is used for residential, recreational, commercial, agricultural, and industrial purposes.

The nearest residential properties are located approximately 1/8-mile north (upgradient) and within 1/4 mile southeast (side-gradient) of the Site. Land use down-gradient of the Site is primarily agricultural with a limited number of structures (the PRASA facility as well as some fences) between the Site and the Rio Grande de Patillas. The agricultural use is primarily for local populations (as opposed to commercial farming), and based on observations made during groundwater monitoring and investigative activities at the Site, agricultural workers access the downgradient areas on an intermittent basis. There are no residences or water supply wells used for human consumption (including irrigation) between the Site and the Rio Grande de Patillas. Drinking water in the area is provided by PRASA.

With respect to future land use, there is no information available to indicate future development or changes in the surrounding land use. Land use down-gradient of the Site is currently agricultural, but there are no known land use restrictions. Additionally, no active groundwater drinking wells currently exist down-gradient of the Site, and PRASA supplies drinking water in the area. There are no restrictions on well installation.

## SELECTED REMEDIES

After careful evaluation of cleanup alternatives, **Monitored Natural Attenuation + Institutional Controls** has been identified as the most appropriate for the site. The selected remedy retains and builds upon the existing on-site interim measure which has proven to be effective at controlling source area contamination. Because the

interim measure was already in place, it allowed for preparation of a streamlined CMS Report that focused on a single proposed remedial alternative. The decision to focus the CMS Report on a single proposed remedy was also consistent with EPA's RCRA FIRST guidance (US EPA 2016). This alternative includes groundwater monitoring to document continuing natural attenuation, and use of a deed restriction (onsite only) to prevent groundwater use for any purpose. A periodic evaluation of groundwater use in the off-site area would also be performed as a component of the remedy. The determination of the Remedy Construction will have a re-evaluation of its effectiveness after two years.

MNA has been identified as the most appropriate alternative for the site for the following reason:

- There are no current exposures to groundwater either on-site or off-site. Future potential exposures to off-site groundwater are unlikely because municipal groundwater is available in the area, and changes or redevelopment of the adjacent off-site property are not anticipated.
- The historical source of COCs in groundwater was the French Sump, which was remediated in 1990 and closure of which was approved by USEPA. Based on numerous historical investigations at the Site, a source of VOCs does not currently exist.
- Groundwater monitoring conducted to date has demonstrated that COCs in groundwater are naturally attenuating. Concentrations of COCs have decreased two orders of magnitude in the time period from 1989 to 2015.
- The deed restriction will immediately prohibit the use of the groundwater beneath the Site for any purpose, and a periodic assessment of the off-site groundwater area as a component of the deed restriction. In addition, in May 30, 2017 a response letter from PRASA indicates that the agency has no record of a water supply well behind the WWTP, and in fact maintains only one well within 1 mile of the Site. According to PRASA this well (Pozo La Felicita/Patillas Well #1, located approximately 3/4 mile northwest and hydraulically upgradient of the Site) is inactive (since at least December 2006) and there are no current plans to reintroduce it to active use.

Although, the overall cost for the MNA alternative is higher than other alternatives, the short term costs are controlled.

Overall, this alternative meets both corrective measures objectives, is cost effective, and also meets the objective of ensuring that the selected interim measure is

compatible with the final corrective measure selected for the Site. (USEPA, April 1999 The Use of MNA as a remedial alternative at contaminated sites in the United States).

Based on the recent groundwater monitoring results and historical results, the migration of 1,1-DCE in the groundwater appears to have stabilized and in fact concentrations have been decreasing via natural attenuation. While the case for 1,1-DCE attenuation through dechlorination is not currently apparent (i.e., degradation products have for the most part been non-detectable), the absence of 1,1,1-TCA and the data presented in the 2005 SRFI report indicate that biodegradation or cometabolism attenuation processes have been active in the past. Additionally, the decrease in concentrations of this compound indicates that attenuation is occurring through increased hydrodynamic dispersion, dilution, or a combination of these processes. Non-detectable constituents in groundwater samples from monitoring well P-11 indicate the area of 1,1-DCE in groundwater is shrinking from the upgradient end. While, 1,1-DCE is still present in the localized area of groundwater surrounding monitoring well P-10A at somewhat elevated concentrations, there is clear evidence of attenuation over the period of monitoring.

### OTHER TECHNOLOGIES CONSIDERED

Applicable remedial technologies were evaluated in the CMS prepared for the facility. Some of the technologies to consider are innovative, and may provide advantages over traditional technologies. A list of the remedial alternatives are provided below:

1. No Action
2. Institutional Controls
3. Monitored Natural Attenuation
4. Groundwater Extraction and Ex-Situ Treatment
5. Enhanced Bioremediation
6. Chemical Oxidation
7. Passive Reactive Barrier
8. Groundwater Containment

MNA has demonstrated to be the acceptable remedy to implement for the following reasons:

- There are no current exposures to groundwater either on or offsite. Municipal drinking
- water is supplied to the area;
- Groundwater monitoring over an approximate 26-year period has demonstrated that constituents of concern in groundwater are naturally attenuating;
- Plume size is stable or decreasing; and

- The likely impact of an enhanced bioremediation amendment is expected to be marginal or ineffective, given the relatively low residual concentrations present.

### PUBLIC PARTICIPATION

The USEPA has granted conditional approval of the Selected Remedy for the site and is inviting the public to comment on this document and the proposed remedial alternative to address the contamination found at the site. On (August 5<sup>th</sup>, 2017) a notice inviting the public to comment on the proposed remedy for the facility was published by EPA on the (Primera Hora) newspaper. A forty-five (45)-day public comment period on the proposed remedy will be opened from (Period of Time). If deemed necessary and requested by the public, a hearing will be coordinated by EPA and the GE Company at such effects. Interested persons or parties can submit written comments to:

**Carmen Guerrero, Director**  
**U.S. Environmental Protection Agency**  
**Caribbean Environmental Protection Division**  
**City View Plaza II, Suite 7000**  
**#48 RD. 165 KM 1.2**  
**Guaynabo, PR 00968-8069**

The documents related to the investigations and Selected Remedy will be located on the following repositories:

**Biblioteca Municipal de Patillas**  
**Calle Luis Muñoz Rivera**  
**Antiguo Hospital Viejo**  
**Patillas, Puerto Rico, 00723**

Additional information regarding the facility can be obtained from the facility RCRA Corrective Action Project Manager Ms. Khrystian M. Vazquez. The compliance history of former activities at the facility is also available at EPA, but may be subject to Freedom of Information Act requirements.

### NEXT STEPS

EPA will evaluate all comments received from the public and will determine whether or not the Selected Remedy needs to be revised or is finally approved. If approved, the GE Company's Selected Remedy will be approved as final from EPA.

## IMPACT DETECTED AND CLEANUP GOALS

### Current Distribution of Contaminants in Exposure Media

Constituents in Groundwater	Maximum Concentration (µg/L) (*tap water)	Action Level (µg/L) 1991	Action Level (µg/L) 2017	Cleanup Goal (µg/L)	Point of Compliance
1,1,1-Trichloroethane (1,1,1-TCA)	200	1180	15	200	0
1,1-Dichloroethane (1,1-DCA)	2.8*	13	8	NS	1
1,1-Dichloroethene (1,1-DCE)	7.0	1740	53	7	8
Acetone	14,000*	NT	84	NS	0
Chloroform	80	22	4	80	0

### KEYWORDS

Groundwater, volatile organic compounds, exposure and pathway, attenuation biodegradation, cometabolism and hydrodynamic dispersion.

### CONTACT

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